

New Best-So-Far Solutions for van Breedam's benchmark (Capacitated VRP)

Enrique Alba , Bernabé Dorronsoro

Department of Computer Science, University of Málaga, Spain

Table 1

New best solution for instance **Bre-1**.

	Number of routes	10
	Total solution distance	1106.0
	Capacity	100
Route 1	Distance	99.0
	Visited customers	57, 77, 18, 23, 28, 88, 68, 13, 8, 3
	Capacity	100
Route 2	Distance	98.0
	Visited customers	1, 6, 11, 64, 84, 26, 21, 16, 73, 53
	Capacity	100
Route 3	Distance	96.0
	Visited customers	0, 5, 10, 62, 82, 25, 20, 15, 71, 51
	Capacity	100
Route 4	Distance	101.0
	Visited customers	55, 75, 17, 22, 27, 86, 66, 12, 7, 2
	Capacity	100
Route 5	Distance	121.0
	Visited customers	69, 89, 99, 34, 39, 44, 49, 90, 70, 50
	Capacity	100
Route 6	Distance	124.0
	Visited customers	56, 76, 96, 47, 42, 37, 32, 95, 85, 65
	Capacity	100
Route 7	Distance	122.0
	Visited customers	58, 78, 98, 48, 43, 38, 33, 97, 87, 67
	Capacity	100
Route 8	Distance	98.0
	Visited customers	4, 9, 14, 60, 80, 29, 24, 19, 79, 59
	Capacity	100
Route 9	Distance	124.0
	Visited customers	52, 72, 92, 45, 40, 35, 30, 91, 81, 61
	Capacity	100
Route 10	Distance	123.0
	Visited customers	54, 74, 94, 46, 41, 36, 31, 93, 83, 63

Table 2
 New best solution for instance Bre-2.

	Number of routes	10
	Total solution distance	1506.0
	Capacity	100
Route 1	Distance	108.0
	Visited customers	95, 85, 75, 65, 55, 54, 64, 74, 84, 94
	Capacity	100
Route 2	Distance	149.0
	Visited customers	90, 80, 70, 60, 50, 51, 61, 71, 81, 91
	Capacity	100
Route 3	Distance	184.0
	Visited customers	48, 38, 28, 18, 8, 9, 19, 29, 39, 49
	Capacity	100
Route 4	Distance	121.0
	Visited customers	96, 86, 76, 66, 56, 57, 67, 77, 87, 97
	Capacity	100
Route 5	Distance	166.0
	Visited customers	42, 32, 22, 12, 2, 3, 13, 23, 33, 43
	Capacity	100
Route 6	Distance	158.0
	Visited customers	44, 34, 24, 14, 4, 5, 15, 25, 35, 45
	Capacity	100
Route 7	Distance	149.0
	Visited customers	99, 89, 79, 69, 59, 58, 68, 78, 88, 98
	Capacity	100
Route 8	Distance	121.0
	Visited customers	92, 82, 72, 62, 52, 53, 63, 73, 83, 93
	Capacity	100
Route 9	Distance	166.0
	Visited customers	47, 37, 27, 17, 7, 6, 16, 26, 36, 46
	Capacity	100
Route 10	Distance	184.0
	Visited customers	41, 31, 21, 11, 1, 0, 10, 20, 30, 40

Table 3
 New best solution for instance **Bre-4**.

Number of routes		20
Total solution distance		1470.0
Route 1	Capacity	50
	Distance	82.00
	Visited customers	46, 47, 48, 49, 41
Route 2	Capacity	50
	Distance	51.0
	Visited customers	69, 66, 61, 62, 67
Route 3	Capacity	50
	Distance	60.0
	Visited customers	99, 98, 97, 96, 90
Route 4	Capacity	50
	Distance	71.0
	Visited customers	78, 81, 76, 74, 71
Route 5	Capacity	50
	Distance	111.0
	Visited customers	88, 95, 93, 86, 82
Route 6	Capacity	50
	Distance	39.0
	Visited customers	83, 91, 92, 84, 73
Route 7	Capacity	50
	Distance	111.0
	Visited customers	20, 14, 10, 5, 12
Route 8	Capacity	50
	Distance	82.0
	Visited customers	58, 50, 51, 52, 53
Route 9	Capacity	50
	Distance	74.0
	Visited customers	29, 22, 19, 24, 27
Route 10	Capacity	50
	Distance	51.0
	Visited customers	64, 59, 60, 65, 68
Route 11	Capacity	50
	Distance	51.0
	Visited customers	35, 40, 39, 34, 31
Route 12	Capacity	50
	Distance	111.0
	Visited customers	11, 4, 6, 13, 17
Route 13	Capacity	50
	Distance	111.0
	Visited customers	87, 94, 89, 85, 79
Route 14	Capacity	50
	Distance	74.0
	Visited customers	28, 21, 18, 23, 25
Route 15	Capacity	50
	Distance	82.0
	Visited customers	54, 55, 56, 57, 63
Route 16	Capacity	50
	Distance	74.0
	Visited customers	70, 77, 80, 75, 72
Route 17	Capacity	50
	Distance	60.0
	Visited customers	9, 3, 2, 1, 0
Route 18	Capacity	50
	Distance	39.0
	Visited customers	26, 15, 7, 8, 16
Route 19	Capacity	50
	Distance	82.0
	Visited customers	36, 42, 43, 44, 45
Route 20	Capacity	50
	Distance	51.0
	Visited customers	30, 33, 38, 37, 32

Table 4

New best solution for instance **Bre-5**.

	Number of routes	5
	Total solution distance	950.0
	Capacity	200
Route 1	Distance	180.0
	Visited customers	97, 88, 98, 78, 89, 69, 99, 79, 59, 40, 30, 20, 39, 29, 49, 38, 28, 48, 57, 77
	Capacity	200
Route 2	Distance	228.0
	Visited customers	45, 34, 44, 63, 83, 93, 73, 53, 64, 84, 94, 74, 54, 65, 85, 95, 75, 55, 66, 86
	Capacity	200
Route 3	Distance	135.0
	Visited customers	96, 76, 56, 46, 35, 25, 14, 24, 13, 23, 12, 3, 4, 5, 15, 6, 16, 36, 67, 87
	Capacity	200
Route 4	Distance	153.0
	Visited customers	37, 17, 8, 18, 9, 19, 0, 10, 21, 41, 31, 42, 32, 22, 11, 2, 1, 7, 27, 47
	Capacity	200
Route 5	Distance	254.0
	Visited customers	26, 33, 43, 52, 72, 92, 82, 62, 51, 71, 91, 81, 61, 50, 70, 90, 80, 60, 58, 68
	Capacity	200

Table 5

New best solution for instance **Bre-6**.

	Number of routes	5
	Total solution distance	969.0
	Capacity	200
Route 1	Distance	187.0
	Visited customers	46, 39, 32, 71, 25, 18, 66, 67, 11, 61, 4, 62, 63, 26, 33, 76, 81, 88, 40, 47
	Capacity	200
Route 2	Distance	151.0
	Visited customers	97, 96, 37, 30, 70, 23, 16, 64, 9, 65, 68, 49, 73, 31, 83, 38, 91, 90, 45, 98
	Capacity	200
Route 3	Distance	217.0
	Visited customers	78, 74, 19, 12, 5, 54, 55, 56, 57, 6, 13, 20, 27, 34, 41, 82, 86, 93, 95, 48
	Capacity	200
Route 4	Distance	218.0
	Visited customers	44, 77, 72, 8, 1, 53, 52, 51, 50, 0, 7, 14, 21, 28, 35, 79, 85, 89, 94, 42
	Capacity	200
Route 5	Distance	196.0
	Visited customers	43, 36, 87, 80, 75, 29, 22, 15, 58, 59, 60, 2, 3, 10, 17, 69, 24, 84, 92, 99
	Capacity	200

Table 6
 New best solution for instance **Bre-9**.

	Number of routes	10
	Total solution distance	1690.0
Route 1	Capacity	100
	Distance	143.0
	Visited customers	47, 48, 41, 90, 88, 84, 82, 34, 86, 40, 46
Route 2	Capacity	100
	Distance	146.0
	Visited customers	32, 78, 73, 26, 27, 75, 81, 33, 39
Route 3	Capacity	100
	Distance	208.0
	Visited customers	72, 22, 15, 8, 58, 59, 60, 2, 9, 65, 68
Route 4	Capacity	100
	Distance	232.0
	Visited customers	20, 13, 6, 57, 56, 55, 54, 5, 11, 25, 92
Route 5	Capacity	100
	Distance	64.0
	Visited customers	97, 45, 94, 91, 38, 95, 99, 98
Route 6	Capacity	100
	Distance	146.0
	Visited customers	96, 37, 30, 70, 23, 77, 29, 74, 80, 85, 36, 44
Route 7	Capacity	100
	Distance	140.0
	Visited customers	79, 83, 87, 89, 35, 42, 43
Route 8	Capacity	100
	Distance	234.0
	Visited customers	16, 64, 1, 53, 52, 51, 50, 0, 7, 14, 21, 28
Route 9	Capacity	100
	Distance	157.0
	Visited customers	93, 31, 76, 49, 69, 66, 67, 18, 71
Route 10	Capacity	100
	Distance	220.0
	Visited customers	19, 12, 63, 62, 61, 4, 3, 10, 17, 24

Table 7
 New best solution for instance Bre-10.

	Number of routes	10
	Total solution distance	1026.0
Route 1	Capacity	100
	Distance	80.0
	Visited customers	83, 81, 67, 63, 65, 64, 69, 80, 82, 1
Route 2	Capacity	100
	Distance	63.0
	Visited customers	6, 2, 27, 23, 20, 22, 24, 26, 28, 29
Route 3	Capacity	100
	Distance	135.0
	Visited customers	35, 34, 31, 30, 32, 36, 38, 39, 13
Route 4	Capacity	100
	Distance	135.0
	Visited customers	49, 44, 41, 58, 54, 59, 60, 61, 62, 66, 68
Route 5	Capacity	100
	Distance	206.0
	Visited customers	37, 33, 56, 52, 50, 51, 53, 55, 57, 70, 72
Route 6	Capacity	100
	Distance	68.0
	Visited customers	17, 19, 18, 16, 14, 15, 12, 10, 11
Route 7	Capacity	100
	Distance	55.0
	Visited customers	7, 88, 89, 87, 85, 84, 86, 3, 5, 9
Route 8	Capacity	100
	Distance	136.0
	Visited customers	93, 78, 79, 77, 75, 73, 71, 74, 76
Route 9	Capacity	100
	Distance	67.0
	Visited customers	92, 90, 91, 94, 95, 97, 99, 98, 96
Route 10	Capacity	100
	Distance	81.0
	Visited customers	8, 4, 0, 47, 45, 43, 40, 42, 46, 48, 21, 25

Table 8

New best solution for instance **Bre-11**.

	Number of routes	10
	Total solution distance	1128.0
Route 1	Capacity	100
	Distance	117.0
	Visited customers	36, 26, 16, 6, 7, 17, 27, 46, 56, 66
Route 2	Capacity	100
	Distance	105.0
	Visited customers	93, 82, 91, 90, 80, 70, 71, 72, 83
Route 3	Capacity	100
	Distance	60.0
	Visited customers	95, 85, 75, 55, 54, 64, 74, 84, 94
Route 4	Capacity	100
	Distance	105.0
	Visited customers	73, 62, 61, 51, 41, 31, 42, 52, 63
Route 5	Capacity	100
	Distance	107.0
	Visited customers	86, 77, 58, 48, 38, 37, 47, 57, 67, 76
Route 6	Capacity	100
	Distance	152.0
	Visited customers	32, 21, 11, 1, 0, 10, 20, 30, 40, 50, 60, 81, 92
Route 7	Capacity	100
	Distance	105.0
	Visited customers	44, 34, 24, 14, 4, 5, 15, 25, 35, 45, 65
Route 8	Capacity	100
	Distance	116.0
	Visited customers	43, 33, 23, 13, 3, 2, 12, 22, 53
Route 9	Capacity	100
	Distance	112.0
	Visited customers	87, 88, 78, 68, 79, 89, 99, 98, 97, 96
Route 10	Capacity	100
	Distance	149.0
	Visited customers	69, 59, 49, 39, 29, 19, 9, 8, 18, 28